

## **WHAT IS CLAIMED IS:**

1. A method of identifying those animals having greater milk productivity from a group of livestock animals of the same species comprising:

- (c) selecting the livestock, wherein the selecting comprises:
  - (i) obtaining a nucleic acid molecule sample containing an *ob* gene polymorphism from livestock,
  - (ii) amplifying a region of the *ob* gene polymorphism with the oligonucleotide pair of SEQ ID NO:4 and SEQ ID NO:5 to form nucleic acid amplification products,
  - (iii) contacting the amplified *ob* gene polymorphism sequences from step (ii), with hybridization probes consisting essentially of the oligonucleotide pair of SEQ ID NO:6 and SEQ ID NO:7, labeled with a detectable moiety under suitable conditions permitting hybridization of the labeled oligonucleotide probe to amplified *ob* gene polymorphism sequences to form duplex structures,
  - (iv) detecting the presence of amplified *ob* gene polymorphism sequences by detecting the detectable moiety of the labeled oligonucleotide probe hybridized to the amplified *ob* gene polymorphism sequences, and
  - (v) selecting the type of the livestock animal based on the detection of the *ob* gene polymorphism; and
- (b) identifying those animals having a greater milk productivity based on the presence of a particular *ob* gene polymorphism.

2. The method of claim 1 wherein the selecting comprises determining whether the livestock animal is a TT animal homozygous with respect to the T-allele of the *ob* gene, a CC animal homozygous with respect to the C-allele of the *ob* gene, or a CT animal heterozygous with respect to the T-allele and the C-allele of the *ob* gene.

3. A method of claim 1 wherein the selecting is selecting from the group consisting of TT animals homozygous with respect to the T-allele of the *ob* gene and CT animals heterozygous with respect to the T-allele and the C-allele of the *ob* gene to select those animals having a greater feed conversion efficiency.

4. The method of claim 1 wherein the *ob* gene polymorphism is a C to T transition that results in Arg25Cys.

5. The method of claim 1 wherein the livestock animal is a bovine, an ovine, an avian or a swine.

6. The method of claim 5 wherein the livestock animal is a bovine.

7. The method of claim 6 wherein the bovine is dairy cattle.

8. A method of increasing milk production in a selected group of livestock animals of the same species comprising:

- (a) determining a genetic predisposition of each animal to produce milk by determining their *ob* genotype; and
- (b) selecting animals that possess the T-containing allele of the *ob* gene for inclusion in the group.

9. The method of claim 8 wherein increasing milk production in a selected group of livestock animals of the same species occurs during the first one hundred days of lactation.

10. The method of claim 9 wherein determining comprises determining whether the animal is a TT animal homozygous with respect to the T-allele of the *ob* gene, a CC animal homozygous with respect to the C-allele of the *ob* gene, or a CT animal heterozygous with respect to the T-allele and the C-allele of the *ob* gene.

11. A method of claim 10 wherein selecting is selecting from the group consisting of TT animals homozygous with respect to the T-allele of the *ob* gene and CT animals heterozygous with respect to the T-allele and the C-allele of the *ob* gene.

12. A method of identifying those animals having increased milk productivity compared to general population of animals of the same species by determining their *ob* genotype wherein animals that possess the T-containing allele of the *ob* gene have increased milk productivity compared to animals that possess only the C-containing allele of the *ob* gene.

13. A method of claim 12 wherein TT animals homozygous with respect to the T-allele of the *ob* gene have a greater milk productivity than CT animals heterozygous with respect to the T-allele.

14. A method of breeding livestock animals to increase milk production in the offspring comprising selecting breeding pairs of livestock animals of the same species to increase occurrence of the *ob* T-allele in the offspring.

15. The method of claim 14 wherein the milk production is increased in the first one hundred days of lactation in the offspring.

16. A method of increasing milk production in a selected group of livestock animals of the same species comprising:

- (a) determining a genetic predisposition of each animal to produce milk by determining their *ob* genotype;
- (d) selecting animals that possess the T-containing allele of the *ob* gene for inclusion in the group; and
- (e) increasing the amount of feed for in the selected group.

17. The method of claim 16 wherein increasing milk production in a selected group of livestock animals of the same species occurs during the first one hundred days of lactation.

18. The method of claim 17 wherein determining comprises determining whether the animal is a TT animal homozygous with respect to the T-allele of the *ob* gene, a CC animal homozygous with respect to the C-allele of the *ob* gene, or a CT animal heterozygous with respect to the T-allele and the C-allele of the *ob* gene.

19. A method of claim 18 wherein selecting is selecting from the group consisting of TT animals homozygous with respect to the T-allele of the *ob* gene and CT animals heterozygous with respect to the T-allele and the C-allele of the *ob* gene.

20. The method of any one of claims 8, 12, 14 or 16 wherein the livestock animal is a bovine, an ovine, an avian or a swine.

21. The method of claim 20 wherein the livestock animal is a bovine.

22. The method of claim 21 wherein the bovine is a dairy cattle.